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Title: Pressurizing Hagan and SAVY containers to 30-psig (air) to measure the release of analytical cerium oxide test powder

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| 2.1 Security Classification: Unclassified/Does not Contain UCNI |
| 2.2 DC/RO: *(Name, Z Number, Organization, Signature, Date)*<br>*Tristan McDonald, 189940, ES-55* TRISTAN MCDONALD (Affiliate)<br>Digitally signed by TRISTAN MCDONALD (Affiliate)<br>Date: 2021.01.29 08:45:04 -07'00' |

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| **3.0 APPROVALS** |
|---|
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**5.0 REVISIONS**

| Rev | Date | Description of Change(s) | Preparer | Verifier | RM | FDAR |
|---|---|---|---|---|---|---|
| 0 | | Original Issue | | | | |
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## 1.0 PURPOSE

The need to pressure-test known nuclear material storage containers has been made apparent by the CSE (cognizant systems engineer) assigned to containers at TA-55. The main goal of the current study is to understand the behavior of the SAVY-4000 and Hagan containers during an internal pressurization (30 psig) event. The experiments incorporated a nominal mass of 100 g of $CeO_2$ (cerium oxide) powder to simulate MAR (material at risk) conditions. For the experimental results with mass losses of 0.0±0.1 g mass loss), using ASME error analysis, there is a total expanded uncertainty in a 95% confidence interval (±0.25 g) for the tested SAVY-4000 and Hagan containers. For purposes of conservatism, this has been rounded upward to yield a bounding value for the damage ratio DR = 0.003 = 0.3%.

## 2.0 METHODOLOGY

An experimental system was developed to deliver a pressure pulse that mimics a scenario of the bursting of a sealed source inside a Hagan or SAVY storage container. Six tests were done with 5QT SAVY-4000 and six tests with 8QT Hagan containers (Table 1). Note two different SAVY lids were subjected to three successive test insults (each SAVY filter received three insults). The Hagan container filters only received one test insult per filter (Table 1).

This was a test series performed in December 2020, and the Dec 2020 test is a repetition of a similar test done in October 2020. Therefore, all of the individual filters had been challenged multiple times with 30 psig pressure pulses and $CeO_2$ test powder.

Before the tests, the filters were visually inspected, and all containers, lids and O-rings were in good physical condition.

Table 1. Test indices correspond to the sequential insults on the filters.

| **Test indices for the 30-psig pressurizations** | **Container type and lid ID number** |
|---|---|
| SAVY 1st, 2nd, 3rd (three insults per filter) | 5QT SAVY; Lid # 081305135L |
| SAVY 4th, 5th, 6th (three insults per filter) | 5QT SAVY; Lid # 012005142L |
| Hagan 0.625” diameter filter (one insult per filter)<br><br>2nd, 3rd, and 4th tests | 8QT Hagan body 08-06-08154<br>Filters:<br>(2nd) NUCFIL-019 2-08 LANL 2143<br>(3rd) NUCFIL-019 2-08 LANL 3012<br>(4th) NUCFIL-019 2-08 LANL 3029 |
| Hagan 0.375” diameter filter (one insult per filter)<br><br>1st, 5th, 6th tests | 8QT Hagan body 08-06-08154<br>Filters:<br>(1st) NUCFIL-013 09-06 LANL 559<br>(5th) NUCFIL-013 10-02 LANL 2062<br>(6th) NUCFIL-013 10-02 LANL 2213 |

To prepare a container for a pressure insult test (Table 2), an empty test container with attached pipe fittings (Figure 1) was placed on a mass balance (Mettler Inc; Columbus OH; model SR64001; Los Alamos S&CL ID #028289; calibration due 4-27-2021). The rated instrument uncertainty is ±0.1 g.

The mass balance was then tared to a zero reading, and cerium oxide (CeO2) powder was loaded into a nozzle in the container (Figure 1 and 2) to a nominal weight of 100±2 g. Then the gross weight of the “container and fittings and powder” assembly was measured (to a resolution of ± 0.1 g) and photographed before each test. After the pressure pulse test, the “container and fittings and powder” assembly was weighed and the display weight was photographed after the test.

Figure 1. Cerium oxide powder inside a SAVY container before a pressurization test.

Table 2. Dry weights of tested containers

| Tested container types | Empty container mass |
|---|---|
| 5QT SAVY, with piping fixtures | 3645.6 |
| 8QT Hagan 0.625-dia filter, with piping fixtures | 3591.1 |
| 8 QT Hagan 0.375-dia filter, with piping fixtures | 3486.0 |

A 47 mm filter holder (model RVPH-20 HI-Q Inc San Diego CA) with a honeycomb backing mesh (4 mm diameter openings) was used to support a stainless steel mesh (Fisher Sci 59-004648-0010) screen (125 µm holes, and 23% open area fraction). The RVPH-20 filter holder has a 42 mm effective diameter, but the custom nozzle flares out to an opening with a 47 mm diameter (Figures 2 and 3). Note the direction of air flow in the nozzle (for these tests) is reverse to the intended direction, if this were an air sampling application.

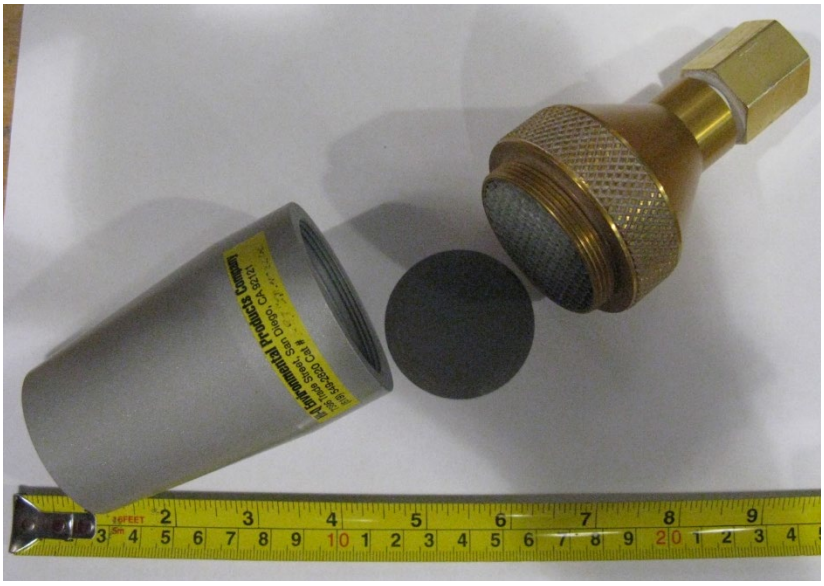

Figure 2. HI-Q Inc 47 mm filter holder, steel mesh screen and custom 47 mm diameter nozzle.

Figure 3. Assembled nozzle system.

The containers were attached (Figure 4) to an intermediate (ASME rated) pressure vessel (Drierite Inc model 106-C) and installed (Figure 5) into the Los Alamos RRFMC (Respirable Release Measurement Chamber).

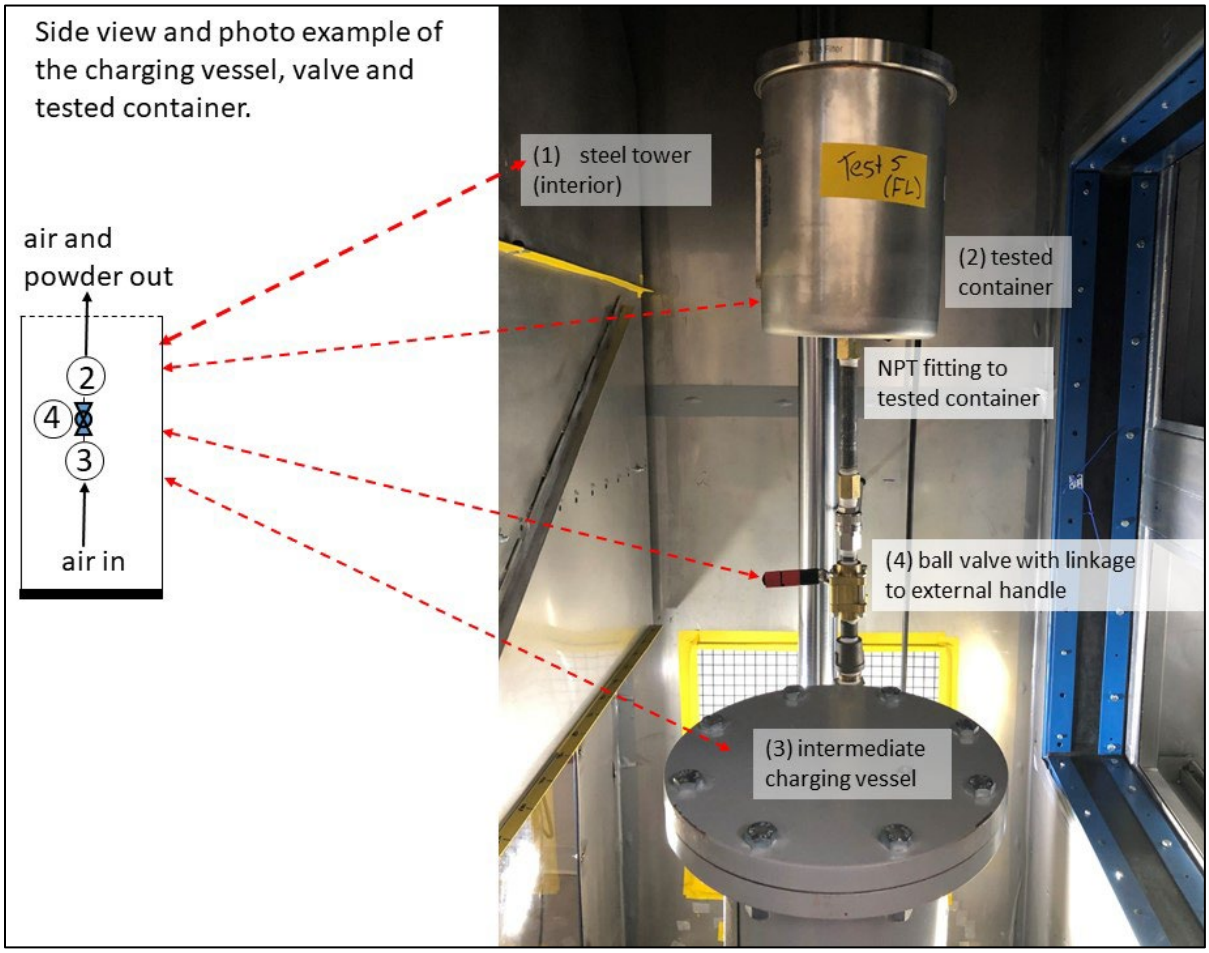


Figure 4. Example photo of intermediate charging vessel, ball valve and test container.

The RRFMC (Moore Tao and Karns 2018) is a drop tower system (Figure 5) integrated into a HEPA filtered aerosol wind tunnel that satisfies NQA-1 subpart 2.4 for R&D work (LANL RP-SVS-RIC-TP-100 “Respirable Release Fraction Measurement Chamber RRFMC (drop tower) procedure”). It drop-tests nuclear material storage containers loaded with cerium oxide powder and measures the released respirable aerosol (< 10 µm AED, aerodynamic equivalent diameter, US DOE 2008) and airborne aerosol, (< 20 µm AED, US DOE 1994). The measurement limits are between 0.3 µm and 20 µm AED with an APS (Aerodynamic Particle Sizer) unit (TSI Inc. Shoreview MN).

After the container was loaded into the RRFMC, the access door was closed and the APS (Figure 6) was started before the pressure pulse test to gather background aerosol measurements and establish a baseline. The intermediate pressure vessel was charged to slightly more than the 30-psig test value, with allowance for the combined volumes of the intermediate vessel and the tested container. To pulse the container and evacuate the $CeO_2$ test powder out of the nozzle, a ball valve was manually cycled over a one-second interval (opened and closed) using a mechanical linkage from outside the drop tower. The combined volume of the intermediate vessel and the tested container would equilibrate to the 30-psig test pressure, and the APS then measured any released aerosol in the downstream portion of the wind tunnel.

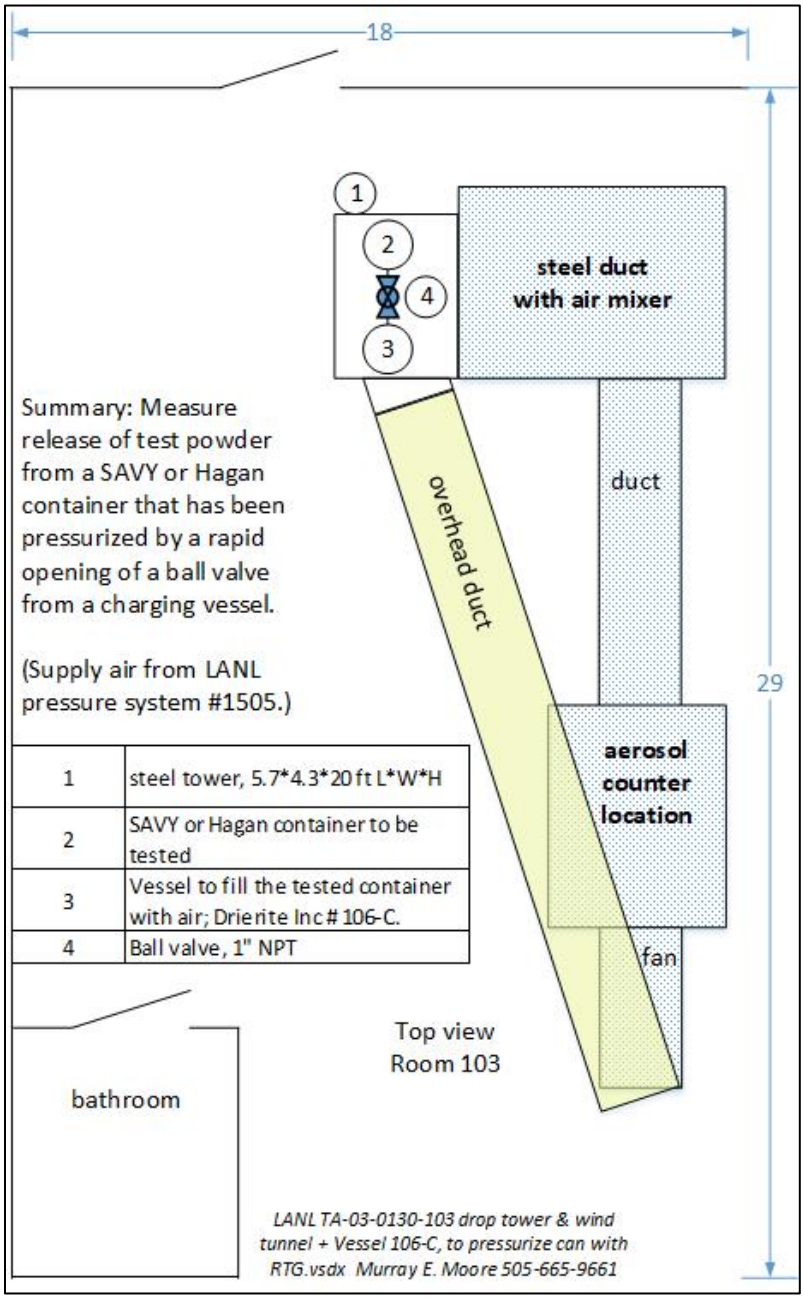


Figure 5. Tests conducted in the LANL RRFMC (Respirable Release Fraction Measurement Chamber).


Figure 6. TSI Inc. model 3321 APS Aerodynamic Particle Sizer

The RRFMC drop tower was designed for container drop tests with an integrated pressure system, approved LANL pressure system ID number, and individual components that are operationally pressure rated. For these pressurized powder tests, the existing Drierite 106-C air drier (already contained in the pressure system) was repurposed (it is an ASME-rated pressure vessel) as the intermediate charging vessel for safe operation of these tests. The Drierite 106-C is normally used to supply ultra-dry airflow for experiments involving liquid droplet aerosol generation. Liquid droplet aerosol generation was not relevant to these tests, and the drop tower was retrofitted for the pressure pulse testing activities.

The first pressurized powder test used a two gallon pail (Cary Co. model #26W098) with a 1-mm diameter orifice in the lid of the pail (Figure 7). A 0.5-mm diameter orifice would have the same pressure drop characteristics as a nominal Hagan or SAVY filter, i.e. about a 0.6 inWC (inches of water column) for an airflow rate of 0.2 ALPM. For this current project, only an orifice of 1-mm diameter was possible, given the time allowed for this effort.

Figure 7. Two gallon (#26W098) pail (Cary Co., Addison IL)

## 3.0 ACCEPTANCE CRITERIA

The test results can be used to evaluate acceptance criteria for the experimental methodology and container studies.

Eight of the twelve tested (Hagan and SAVY) containers (Table 3) had zero measurable released mass (net differences of 0.0±0.1 g before and after the pressure tests). Although a loss of mass is expected for these tests, four of the twelve tests indicated a mass gain on the digital mass balance readout (i.e. M(pre) – M(post) = -0.1±0.1 g. For the damage ratio DR calculations, this "mass gain" is interpreted as a zero value. The values of -0.1 g are within the resolution of the mass balance device (Table 3). Note the negative mass differentials are non-real because the final measured mass is greater than the initial mass by 0.1 g.

Table 3. Measurements of pretest and post-test fixture masses. Note that the operator would record the visually averaged data fluctuations, while photographs capture instant values.

| | Datasheet log | | Differential loss of mass, g | Photo log | |
|---|---|---|---|---|---|
| Container Index | Pretest, g | Post test, g | | Pretest, g | Post test, g |
| Hagan 1 | 5150.9 | 5150.9 | 0.0 | 5150.9 | 5150.8 |
| Hagan 2 | 5239.8 | 5239.8 | 0.0 | 5239.8 | 5239.8 |
| Hagan 3 | 5339.4 | 5339.4 | 0.0 | 5339.4 | 5339.4 |
| Hagan 4 | 5416.0 | 5416.1 | -0.1 | 5416.1 | 5416.1 |
| Hagan 5 | 5388.0 | 5388.1 | -0.1 | 5388.0 | 5388.1 |
| Hagan 6 | 5415.6 | 5415.7 | -0.1 | 5415.6 | 5415.7 |
| SAVY 1 | 4590.5 | 4590.5 | 0.0 | 4590.5 | 4590.5 |
| SAVY 2 | 4604.4 | 4604.4 | 0.0 | 4604.4 | 4604.4 |
| SAVY 3 | 4623.9 | 4623.9 | 0.0 | 4623.9 | 4623.9 |
| SAVY 4 | 4644.4 | 4644.4 | 0.0 | 4644.4 | 4644.4 |
| SAVY 5 | 4734.3 | 4734.4 | -0.1 | 4734.3 | 4734.3 |
| SAVY 6 | 4826.0 | 4826.0 | 0.0 | 4826.0 | 4826.0 |

*SAVY 5th. Note a transcription error on the logsheet for SAVY test #5. The post-test photo captured the correct mass as 4734.3 g.*

The experimental values were aggregated together, by container type, and the average loss of mass was calculated (Table 4). The random uncertainty (i.e. standard deviation of the samples), random standard uncertainty (Sx-bar) and the systematic error (Bx) of the mass balance instrument (0.1 g) were included to estimate Ux, the total expanded uncertainty (ASME 2013). This interval (±Ux) is expected to contain the true value to 95% confidence:

$$Ux = t^*[(Bx)^2 + (Sx\text{-}bar)^2]^{1/2} \qquad \text{Eq. 1}$$

where t = 2.447 = t-critical; 95%; two-tailed distribution; N=6 samples (Milton and Arnold 1986).

For the Hagan and SAVY containers in this study, the sample size is N=6, while the ASME approach assumes sample sizes N≥30. The t-critical=2.447 value accounts for this distinction.

When the two types of Hagan containers (0.375" filter and 0.625" filter) were tested, the release of respirable aerosol mass was within one error bar of each other (Figures 9, 10 and 13). Consequently, for purposes of the estimated DR, the two Hagan container types were combined into a single estimate for the DR value (Table 4).

Table 4. Average test values, aggregated by container type

| **Tested container types** | AVG mass difference, g | Sx, random uncertainty (std deviation) | Sx-bar, random std uncertainty, Sx/sqrt(N) | Bx, systematic uncertainty | Ux, 95% confidence, total expanded uncertainty |
|---|---|---|---|---|---|
| Hagan filters (6 total) | -0.0500 | 0.0548 | 0.0224 | 0.1 | 0.251 |
| SAVY filters (six total) | -0.0167 | 0.0408 | 0.0167 | 0.1 | 0.248 |

Compared to the nominal test powder MAR mass of 100 g, less than 0.1% of the powder test mass was released. For this calculation, the measured mass loss is zero (0.0 g), but the total expanded uncertainty was utilized. Following the methodology from the initial series of tests on SAVYs and Hagans done at SwRI (Southwest Research Institute) for drop and fire insults (McDaneld 2012), the damage ratio can be calculated as:

$$DR = 1 - \frac{M_{post}}{M_{pre}} \qquad \text{Eq. 2}$$

where, $M_{post}$ = post test mass and
$M_{pre}$ = pre test mass.

For example, if the mass loss is 0.0±0.3 g, the worst case estimate for the mass loss would be 0.3 g. Then the DR = [1-(99.7/100)]*100% = 0.3%.

For the test series for this calculation, engineering judgment is used to estimate a bounding value for the DR, based on the averaged results, random error and systematic uncertainty (Table 5). (To be explicit, the worst case mass loss is taken to be the value of Ux, the total expanded uncertainty.)

Table 5. Calculated DR damage ratio, and the bounding value, rounded upward for conservatism.

| **Tested container types** | DR, Damage Ratio, 95% confidence | DR%, Damage Ratio, 95% confidence | **DR% Conservative Bounding Value** |
|---|---|---|---|
| Hagan filters (6 total) | 0.00251 | 0.25% | **0.3%** |
| SAVY filters (six total) | 0.00248 | 0.25% | **0.3%** |

For the 2 gallon Cary™ container (Figure 8A and 8B), with the 100.0 g test load of powder, the container lid was dislodged (Figure 8C), 42.5 g of powder was retained in the container (Figure 8D), and the total released mass value was 57.5 g. The 2 gallon Cary™ container test was performed to generate a representative result, and the measurements were only used as a point of general comparison.

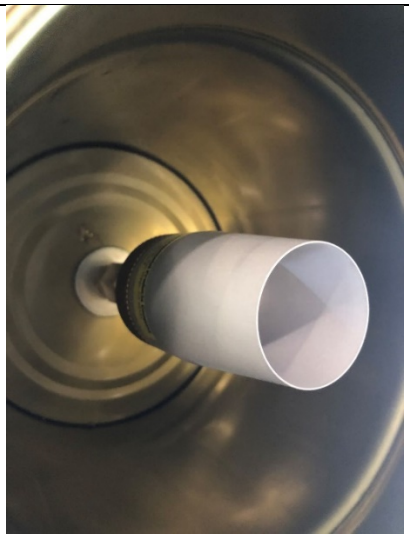

Figure 8A.

Figure 8B.

Figure 8C.


Figure 8D.

Figure 8. Photos of the Cary™ can before the test (8A), after the test (8B), the lid after the test (8C) and measurement of the powder retained in the container (8D).

The APS system produces tabular and graphical outputs of aerosol particle size and mass concentrations. Figures 9 and 10 give a snapshot from one Hagan container, and Figures 11 and 12 are from one of the SAVY tests.

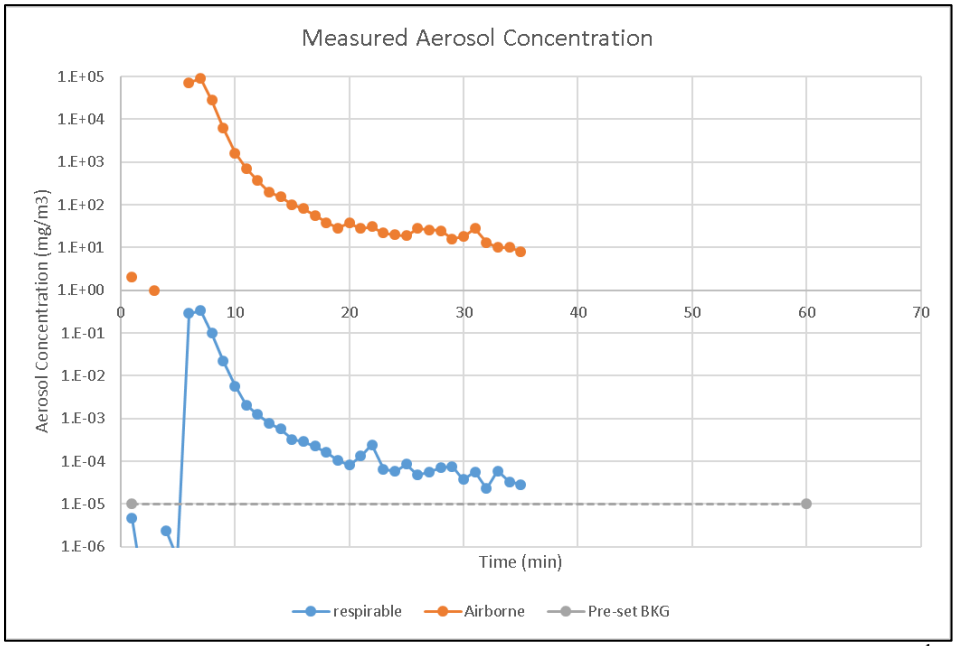


Figure 9. Aerosol concentration versus time (test pulse at 6 min) for "2nd Hagan".

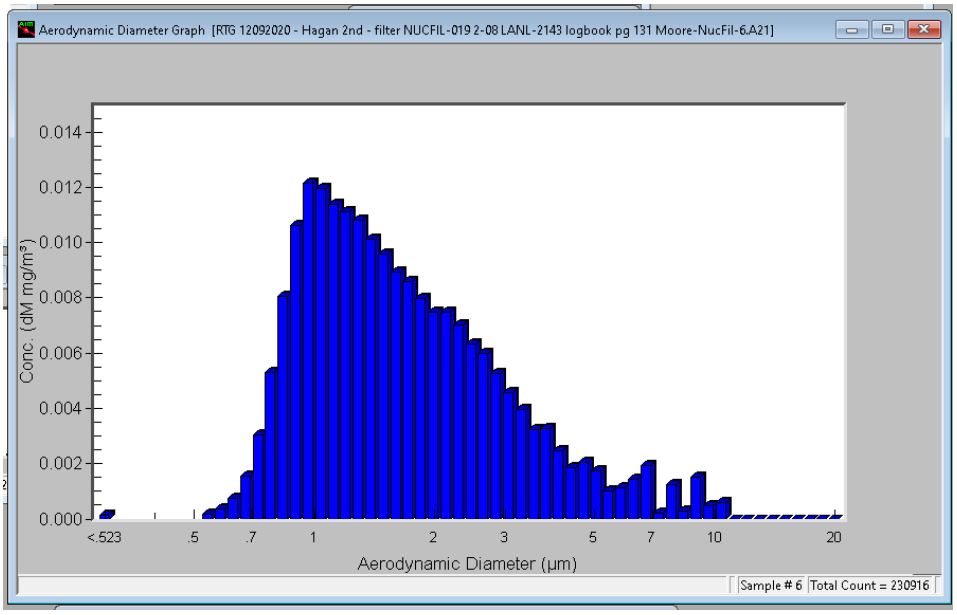


Figure 10. Aerosol concentration versus particle diameter (at 6 min) for the "2nd Hagan".

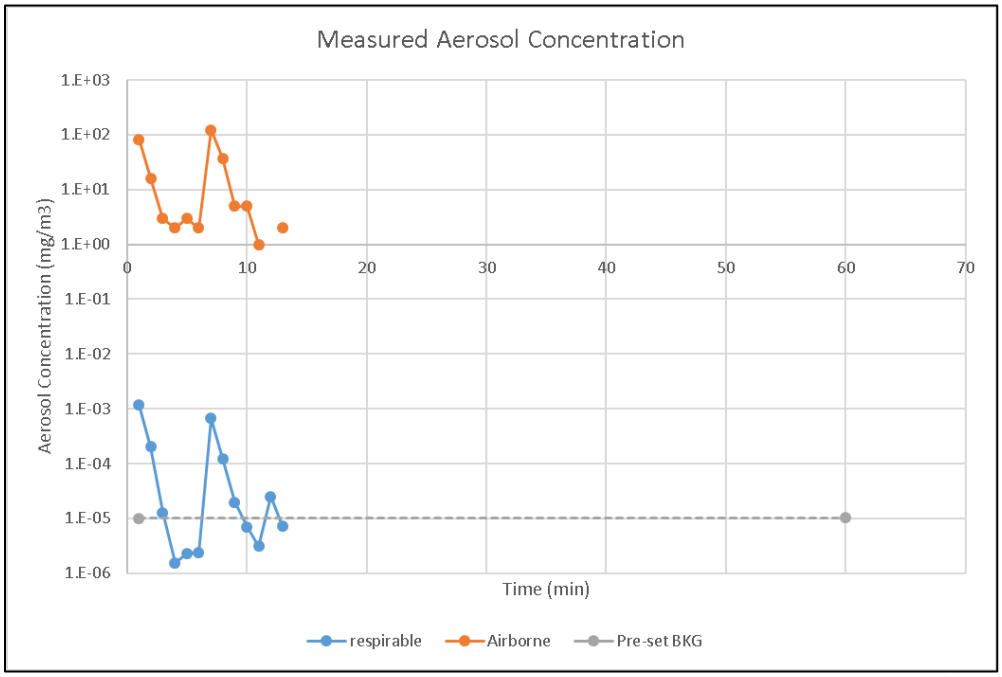


Figure 11. Aerosol concentration versus time (test pulse at 7 min) for "2nd SAVY". (RTG 12092020 - Hagan 2nd - filter NUCFIL-019 2-08 LANL-2143 logbook pg 131 Moore-NucFil-6.xlsx)

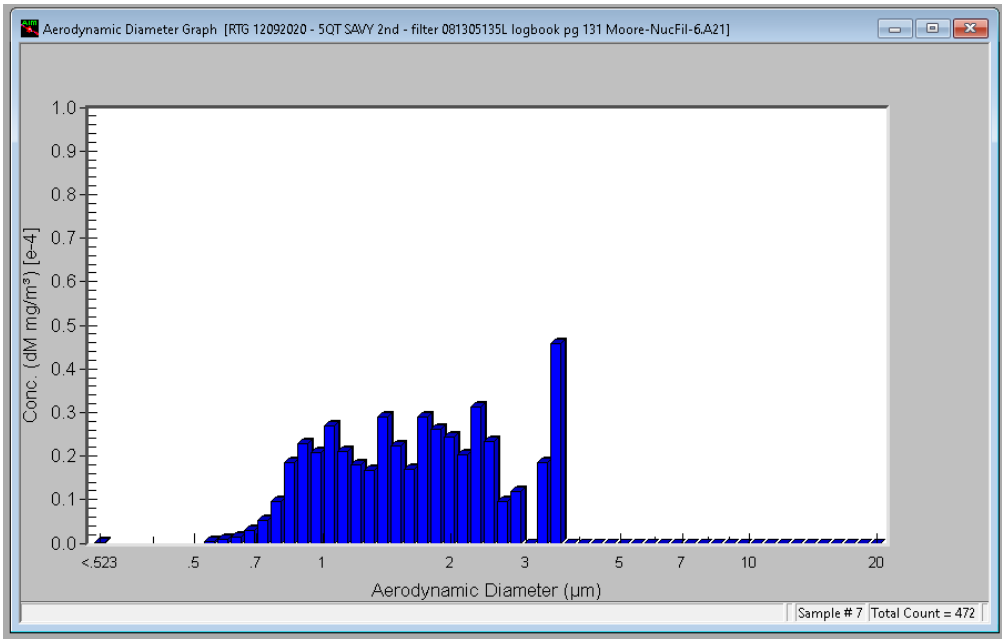


Figure 12. Aerosol concentration versus particle diameter (at 7 min) for "2nd SAVY".

## 4.0 UNVERIFIED ASSUMPTIONS

There are no unverified assumptions in this calculation.

## 5.0 ASSUMPTIONS

The tests used a one-second pulse of air that was initiated by the manual turn of a ball valve. The valve handle was connected to a manual linkage. The operator was therefore outside of the airtight test chamber. The one-second air pulse is assumed to be representative of a rapid pressurization of gases inside a container.

Air is the operational experimental gas for these tests, and there is entrained $CeO_2$ powder inside the container, with measured trace amounts that were transported into the aerosol wind tunnel. For experimental tests, the mixture of air and test powder is assumed to be closely match the gaseous conditions in a hypothetical release.

## 6.0 LIMITATIONS

When calculation use is consistent with the objective, there is no limitation associated with this calculation.

## 7.0 CALCULATION INPUTS

(1) Effective shape factor-corrected density of $CeO_2$ particles (0.68 g $cm^{-3}$) for AIM software with the APS spectrometer (Moore and Tao 2020).

(2) Use the Stokes Correction Factor in the TSI Inc AIM software for the APS spectrometer, since the particle density is less than 0.9 g $cm^{-3}$.

(3) RRFMC system air flow rate (FR, $m^3$ $s^{-1}$) measured by TSI Inc 9565P anemometer.

(4) The first and last column letters in the raw data table of the Excel spreadsheets correspond to the time of the start of the pressure pulse and the time of the reestablishment of the particle background equilibrium, respectively.

## 8.0 COMPUTER HARDWARE AND SOFTWARE

Operation system: Microsoft Windows 10.

Software: (1) Microsoft Excel
(2) Aerosol Instrument Manager Software for Aerodynamic Particle Sizer (TSI Inc Shoreview MN).

## 9.0 SUMMARY AND CONCLUSIONS

**For the observed experimental results of zero loss of mass (0.0±0.1 g),**
**and a total expanded uncertainty (in a 95% confidence interval of ±0.25 g),**
**the conservative bounding value of the DR = 0.003 = 0.3% for the SAVY and Hagan containers.**
**(See Table 5 for details.)**

The released mass, respirable mass and airborne mass of $CeO_2$ test powder are measured for the rapid (about 1 second) pressurization (to 30 psig) of SAVY and Hagan containers. The aerosol background concentrations in the test chamber (wind tunnel) are measured before each test. The background values are within about an order of magnitude of each other.

Note each SAVY filter received three separate pressurized insults, while the Hagan filters received only one (each) pressure pulse insult.

The APS measured the net respirable and net airborne mass (Table 6). Note the APS is capable of measuring much smaller values of test powder than the Mettler mass balance (Table 6).

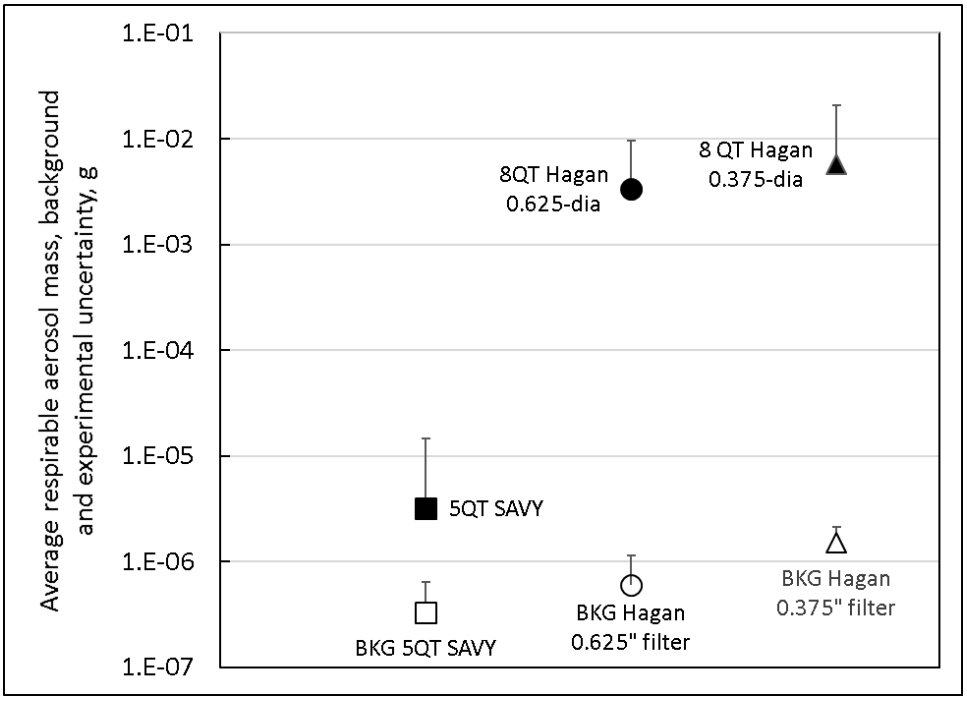


Figure 13. Measured average respirable mass released after a rapid 30 psig pressurization. Six measures were done for the SAVY type, and three measures for each of the two Hagan types.

Aerosol backgrounds were measured for all tests, and positive error bars indicate the experimental uncertainty.

Table 6. Measured released mass, respirable mass and airborne mass. Aerosol backgrounds were measured for all tests, and the experimental uncertainty for each container type is shown.

| *Because the test mass was 100 g of powder, these gram quantities are also the "percent" values.* | **Net released mass[1], g** | Net respirable mass[2], g | ± | Uncertainty respirable mass (net)[2], g | Net airborne mass[2], g | ± | Uncertainty airborne mass (net)[2], g |
|---|---|---|---|---|---|---|---|
| 5QT SAVY Avg and Combined Uncertainty | **0.0 ± 0.25 g** | 3.22E-06 | ± | 1.15E-05 | 1.02E-05 | ± | 4.45E-05 |
| 8QT Hagan 0.625-dia filter. (Average and Combined Uncertainty) | **0.0 ± 0.25 g** | 3.37E-03 | ± | 6.23E-03 | 3.51E-03 | ± | 6.45E-03 |
| 8 QT Hagan 0.375-dia filter (Average and Combined Uncertainty | **0.0 ± 0.25 g** | 5.77E-03 | ± | 1.48E-02 | 5.93E-03 | ± | 1.52E-02 |

*(1) 95% total expanded uncertainty with testing and mass balance SR64001 (Mettler Inc. (Columbus OH).*
*(2) With testing and a Model 3321 APS Aerodynamic Particle Sizer (TSI Inc Shoreview MN).*

From a structural standpoint, the SAVY-4000 and the Hagan container performed very similarly. After the 30-psig test pulses, there were no visual indications of bulging of the container body in either container type. The SAVY-4000 container was tested in other pressure related work at New Mexico Tech, where the container was exposed to pneumatic and hydrostatic pressure insults. In those tests, the SAVY-4000 containers began showing visual signs of plastic deformation at approximately 60-psig from internal pressure insults. Since this current work did not approach that internal 60-psig pressure, we were confident that complications would not arise.

However, we did not have the same history of knowledge for the Hagan, as this specific type of “pressure pulse” test had never been conducted. In the current test, the Hagan still performed well in this respect, and did not indicate deformation or bulging for an estimated force of 1,100 lbf on the internal face of each lid.

For all the tests, this force impulse did not have an apparent negative effect on the structural performance. This is a key result, as the pressure pulse did not permanently disfigure the sealing surfaces and method of closure, therefore maintaining and reproducing the performance of their respective design functions. Upon completion of each test, the sealing surfaces of each container were inspected for damage, unrecoverable debris lodged in the filter media, and general damage to the filter media etc.

The Hagan filter media is an area of concern when evaluating the complete container performance. In the current tests, both of the SAVY and Hagan filters captured the expelled surrogate material with differing levels of effectiveness and the filter media remained intact. In the case of the Hagan, the carbon fiber media is directly exposed to the incoming powder in a single circular cross section. However, the physical impact of the powder did not dislodge any visible piece of the filter media, and the filter components retained their structural rigidity.

In the SAVY container, the filter material has less direct exposure to powder because of the recessed smaller holes in the filter cup. During the pressure pulse tests, powder impacted onto the filter media during the tests. The small diffusion holes in the filter cup assembly allowed multiple locations for the test powder to cling to the filter material. Impacted powder was removed after tests two and three, and tests five and six respectively. However, even with a HEPA-filtered vacuum cleaner, there were small amounts of material that could not be removed. This powder was not observed to build up and clog the filter during the subsequent tests. This topic has been an area of concern in the past regarding filter performance due to corrosion inside of the container during normal Los Alamos storage conditions.

A measure of the bulk released mass with a mass balance (resolution ±0.1g) yielded a zero net release of 0.0±0.25g of test powder. Uncertainty calculations within a 95% confidence interval, combined with an upward rounding for conservatism yields a bounding value for the damage ratio DR=0.3%.

For measurements of the suspended respirable aerosol (< 10 μm AED), the SAVY-4000 container allowed the passage of about $3x10^{-6}$% of the challenge powder material, and the Hagan allowed the passage of about $1x10^{-2}$% of the challenge powder material.

The LANL facility operations and safety basis personnel can utilize this information to determine if these containers are viable storage systems. The performance of these containers is important for laboratory safety, and this information is valuable for the container designers to ensure a viable and reliable product for the TA-55 PF-4 facility and for the DOE complex at large.

## 10.0 REFERENCES

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## 11.0 CALCULATION

Net aerosol mass (LANL RP-SVS-RIC-TP-100) measured by the system is:

$$\mathrm{m(aerosol)} = \mathrm{C_P}(\frac{\mathrm{g}}{\mathrm{m^3}}) * \mathrm{FR}(\frac{\mathrm{m^3}}{\mathrm{min}}) * \mathrm{T_S(min)}$$

Eq. 1

$C_P$ = respirable or airborne aerosol concentration measured by the APS system and corrected for aerosol deposition losses in the wind tunnel (g/m$^3$),
FR = RRFMC total air flow rate, measured in the duct upstream of the APS (m$^3$/min), and,
Ts = APS sampling interval (1 min).

The deposition losses in the wind tunnel are accounted by a correction factor involving the measured aerosol penetration (Tao and Moore 2018) in the wind tunnel from the aerosol release location to the aerosol measurement location. For the 52 (fifty two) measurement bins (j) between 0.3 µm and 20.0 µm AED in the APS system, the aerosol concentration Cp(g m$^{-3}$) is estimated as:

$$C_P = \frac{C_{UNC}}{P_j}$$

Eq. 2

where $C_{UNC}$ is the uncorrected aerosol concentration measured by the APS aerosol particle counter, and the aerosol penetration $P_j$ at bin (j) for an aerodynamic diameter Dj (µm) is:

$$P_j = \exp(-0.0032\ Da_j^2 - 0.0681).$$

Eq. 3

## 12.0 APPENDIX A – SUPPORTING INFORMATION

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps HAGAN 1ST | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | calced. | | |
| 6 | Calculate charging pressure for gray 9-gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): (37) | Pressure (psig): | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | 1 | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27.0 Hz | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | go nogo gauge | 1 | |
| 22 | Verify charging (system) pressure on PI3: (37 psig) | Pressure (psig): | | |
| 23 | Turn aerosol particle counter on. | 428 PM | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validation. Note five cycles of 1 minute. | $10^{-5}$ mg/m3 | | |
| 27 | SN: 08-06-08154 Body | Filter NUCFIL-013 | 09-06 | LANL 559 |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: (7TH) | | |
| 30 | Pre-Test Total mass 5150.9g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | $1.45 \times 10^{-4}$ mg/m3 | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | FULL 90 MIN. | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | RTC 12082020-Hagen 1st-filter NUCFIL-013 09-06 (ANL-559) logbook p.131 Moore-6 | | | |
| | | | | |
| | Date: 12-8-2020 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 Moore-NucFil 6 | Assistant 3: | | |
| | Operator 1: ME Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

BKG (2) $3 \times 10^{-6}$ mg/m3 (3) $7 \times 10^{-6}$ mg/m3 (4) $7 \times 10^{-5}$ mg/m3 (5) $1 \times 10^{-5}$ mg/m3 (6) $1.7 \times 10^{-5}$ mg/m3

Post Test Total mass 5150.9 g STD.


Pre-test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps HAGAN 2ND | Note FOAMCORE PLATE AT ~7500 BLOCKAGE HORIZ 8 FEET ABOVE FLOOR | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 37 PSIG | Pressure (psig): 37 psig | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | 1 | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | X | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | | 1 | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: 37 | Pressure (psig): 37 | 1 | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validation. Note five cycles of 1 minute. | | 1 | |
| 27 | SN; 08-06-08154, Lid; NUCFIL-0192 | -08 LANL 2143 | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | 2 |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 6TH | 1 (0.22 mg/m3) | |
| 30 | Pre-test Total Mass 5239.8g. | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | 1 | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | 1 | |
| 33 | Open RRFMC door | | X | 2 |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | Post-Test Total Mass 5239.8g. JSR | | | |
| | | | | |
| | Date: 12-9-2020 | Assistant 2: J DAVIS | | |
| | Logbook: p. 131 Moore NuCFil-6 | Assistant 3: | | |
| | Operator 1: MCMOORE | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

PRE-BKG = (1) $3.4\times10^{-6}$ mg/m3 (2) $8.8\times10^{-8}$ mg/m3 (3) $1.5\times10^{-8}$ (4) $1.8\times10^{-6}$ (5) $4\times10^{-7}$ mg/m3

(23) $4.9\times10^{-5}$ mg/m3 (24) $4.4\times10^{-5}$ mg/m3 (25) $6.3\times10^{-5}$ mg/m3 (26) $3.7\times10^{-5}$ mg/m3 (27) $4.3\times10^{-5}$ mg/m3

(29) $5.7\times10^{-5}$ (30) $2.9\times10^{-5}$ (31) (32) $1.8\times10^{-5}$ (33) $4.5\times10^{-5}$ (34) $2.5\times10^{-5}$

(35) $2.2\times10^{-5}$ mg/m3


Pre test

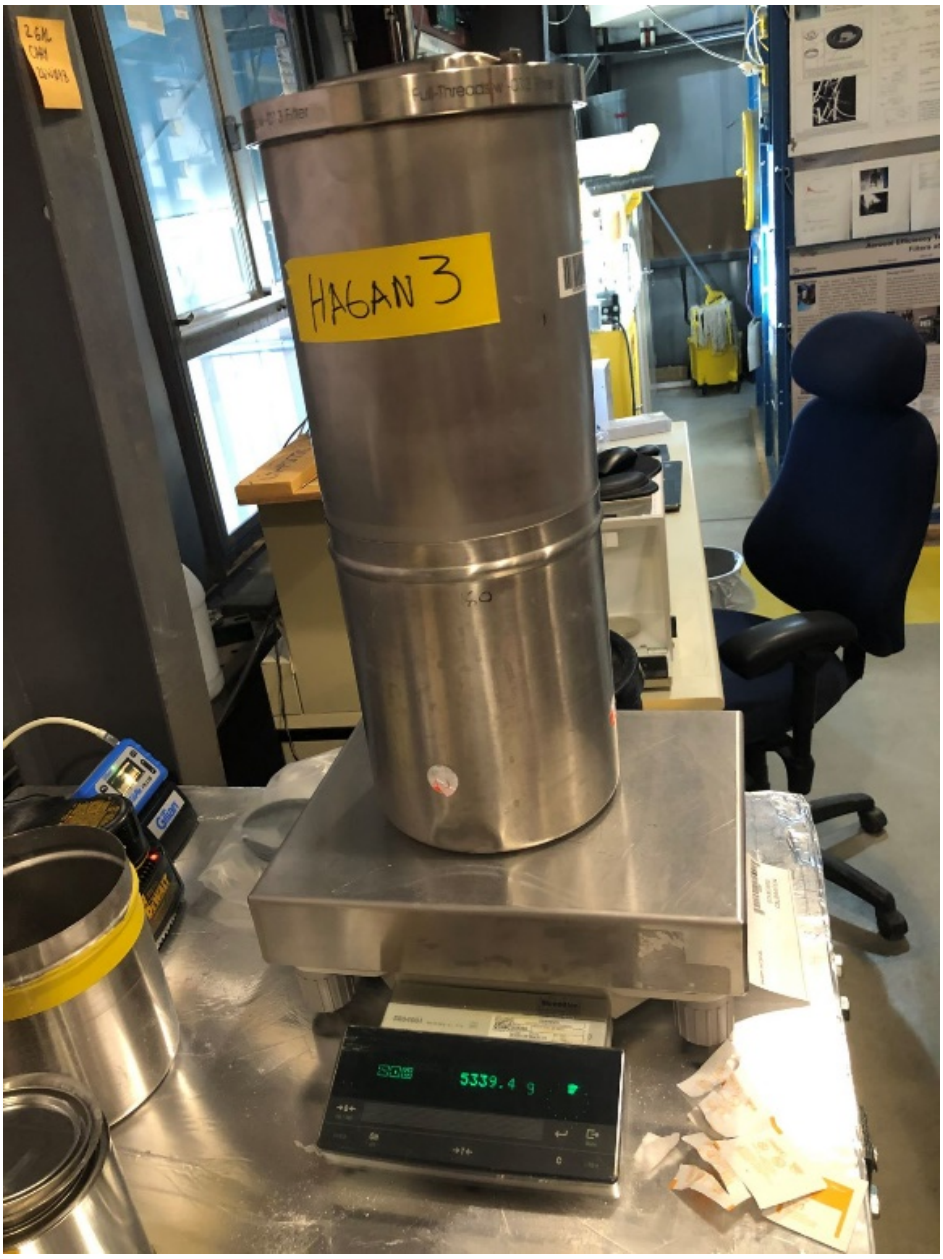

Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps HAGAN 3RD | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | ✓ | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | ✓1 | |
| 7 | Note charging pressure (psig): 37 psig | Pressure (psig): 37 psig | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | ✓ | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | ✓1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | ~~27~~ (27.2) | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: 37 | Pressure (psig): 37 PSIG | 1 | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validation. Note five cycles of 1 minute. | | 1 | |
| 27 | SN: 08-CC-08154, Lid: NWCFTL-CIP2-08 | LANL 3012 | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 8TH | 1 (0.20 | mg/m³) |
| 30 | Pre-Test Total Mass 5339.4g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: p. 131 NWCFTL Moore-6 | Assistant 3: | | |
| | Operator 1: ME Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

PRE BKG ① $1.6\times10^{-5}$ mg/m³ ② $1.7\times10^{-5}$ ③ $1.6\times10^{-5}$ ④ $1.3\times10^{-5}$ ⑤ $1.0\times10^{-5}$ ⑥ $2.5\times10^{-5}$
㉛ $3.3\times10^{-5}$ mg/m³ ㉜ $4.4\times10^{-5}$ ㉝ $1.4\times10^{-5}$ mg/m³ ㉞ $5.7\times10^{-5}$ ㉟ $4.2\times10^{-5}$ mg/m³

Post-Test Total Mass 5339.4g STD




Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps HAGAN 4TH | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | ✓ | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | ✓ | |
| 7 | Note charging pressure (psig): 37psig | Pressure (psig): 37psig | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | ✓ | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | ✓ 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | ✓ 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 Hz | 1 | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: 37psig | Pressure (psig): 37psig | 1 | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | 1 | |
| 27 | SN: 08-06 08154, Lid: NucFil-0192-08 LANL3029 | | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | 2 |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 6TH | 1 (0.14 mg/m3) | |
| 30 | Pre-Test Total Mass: 5416.0gr | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12.9.20 | Assistant 2: Davis | | |
| | Logbook: p. 131 Moore NucFil #6 | Assistant 3: | | |
| | Operator 1: Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step*** | | | |

(1) (2) 3.5 x10-5 mg/m3 (3) 3.8x10-5 mg/m3 (4) 3.8x10-5 (2.3x10-5) (5) 2.3x10-5 BKG

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(27) 3.7x10-5 mg/m3 (28) 5.4x10-5 mg/m3 (29) 6.7x10-5 mg/m3 (30) 4.2x10-5 (31) 6.0x10-5 mg/m3

(32) 3.8x10-5 (33) 3.8x10-5 (34) 3.7x10-5 (35) 4.9x10-5 (36) .. (40) 6.7x10-5

Post-Test Final Mass 5416.1gr STP


Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps HAGAN 5TH | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | 1 | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 37.8516 | Pressure (psig): | 1 | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | ✓ | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | ✓ | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | ✓ | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 HZ | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | | |
| 27 | SN: 08-26 08154 Lid: NUCFIL-03 | 10/02 LANL 2062 | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse 9TH | $7.6\times10^{-2}$ mg/m³ | |
| 30 | Pre-Test Mass 5388.0g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: P.131 Moore Nuclfil - 6 | Assistant 3: | | |
| | Operator 1: M MOORE | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(2) $6.3\times10^{-5}$ mg/m³ (7) $4.0\times10^{-5}$ mg/m³

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(28) $6.1\times10^{-5}$ mg/m³ (29) $1.1\times10^{-4}$ (30) $7.0\times10^{-5}$ (31) $1.0\times10^{-4}$ (32) $6.2\times10^{-5}$ (33) $6.7\times10^{-5}$ mg/m³

(34) $1.1\times10^{-4}$ (35) $8.5\times10^{-5}$ (36) $5.4\times10^{-5}$ (37) $6.6\times10^{-5}$ (38) $4.2\times10^{-5}$ mg/m³

(39) $5.0\times10^{-5}$ (40) $3.7\times10^{-5}$ (41) $4.3\times10^{-5}$ (42) $7.1\times10^{-5}$ (43) $7.8\times10^{-5}$ mg/m³ (44) $2.9\times10^{-5}$

Post-Test Final Mass (5388.1g) 5.2D


Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps HAGAN 6TH. | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70F | | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 37.8516 | Pressure (psig): | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. ✓ | | 1 | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 HZ | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): 37 PSIG | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | 1 | |
| 27 | SN:08-26 0854 Ld; NWCFIL-023 10/02 | LANL 2213 | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 8TH | 8.2x10-2 mg/m3 | |
| 30 | Pre-Test Total Mass ~~5415g~~ | | | |
| | Post-test Steps ~~5415~~ 5415.6g | 5415.6g | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 Moore NWCFIL 6 | Assistant 3: | | |
| | Operator 1: M Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(2) 1.4x10-4 mg/m3 (3) 4.2 x10-5 (4) 2.1 x10-5 (5) 2.3x10-5 (6) 1.5x10-5 (7) 1.5x10-5 mg/m3

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(37) 8.9 x10-5 mg/m3 ... (43) 1.1x10-4 (44) 6.4x10-5 (45) 5.6x10-5 (46) 3.4x10-5 mg/m3

(47) 3.5 x10-5 mg/m3 (48) 4.8x10-5 mg/m3 (49) 6.4x10-5 (50) 5.0x10-5

Post-Test Final Mass 5415.7g STD.


Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps SAVY 1ST | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | 1 | |
| 4 | Note room temp (deg F). | 70°F | | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | ✓ | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 34 PSIG | Pressure (psig): 34 | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | ✓ | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 Hz | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): 35 PSIG | 1 | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | 1 | |
| 27 | 011305006B, 081305135L | SAT SAVY | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | 2 |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 6TH | 8.2 x10⁻⁴ mg/m3 | |
| 30 | Pre-Test Mass 4590.5 g Total | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 Moore - NucFil 6 | Assistant 3: | | |
| | Operator 1: M Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

① 1.8x10⁻⁵ mg/m3 ② 1.7x10⁻⁵ ③ 1.9x10⁻⁵ ④ 1.6x10⁻⁵ ⑤ 3.5x10⁻⁵

\\dcstorage.lanl.gov\to55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

⑨ 1.0x10⁻⁵ mg/m3 ⑩ 1.6x10⁻⁵ ⑪ 4.2x10⁻⁶ ⑫ 4.02x10⁻⁵ ⑬ 1.0x10⁻⁵ mg/m3

Post-Test Final Mass (4590.5 g) S.T.D.


Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

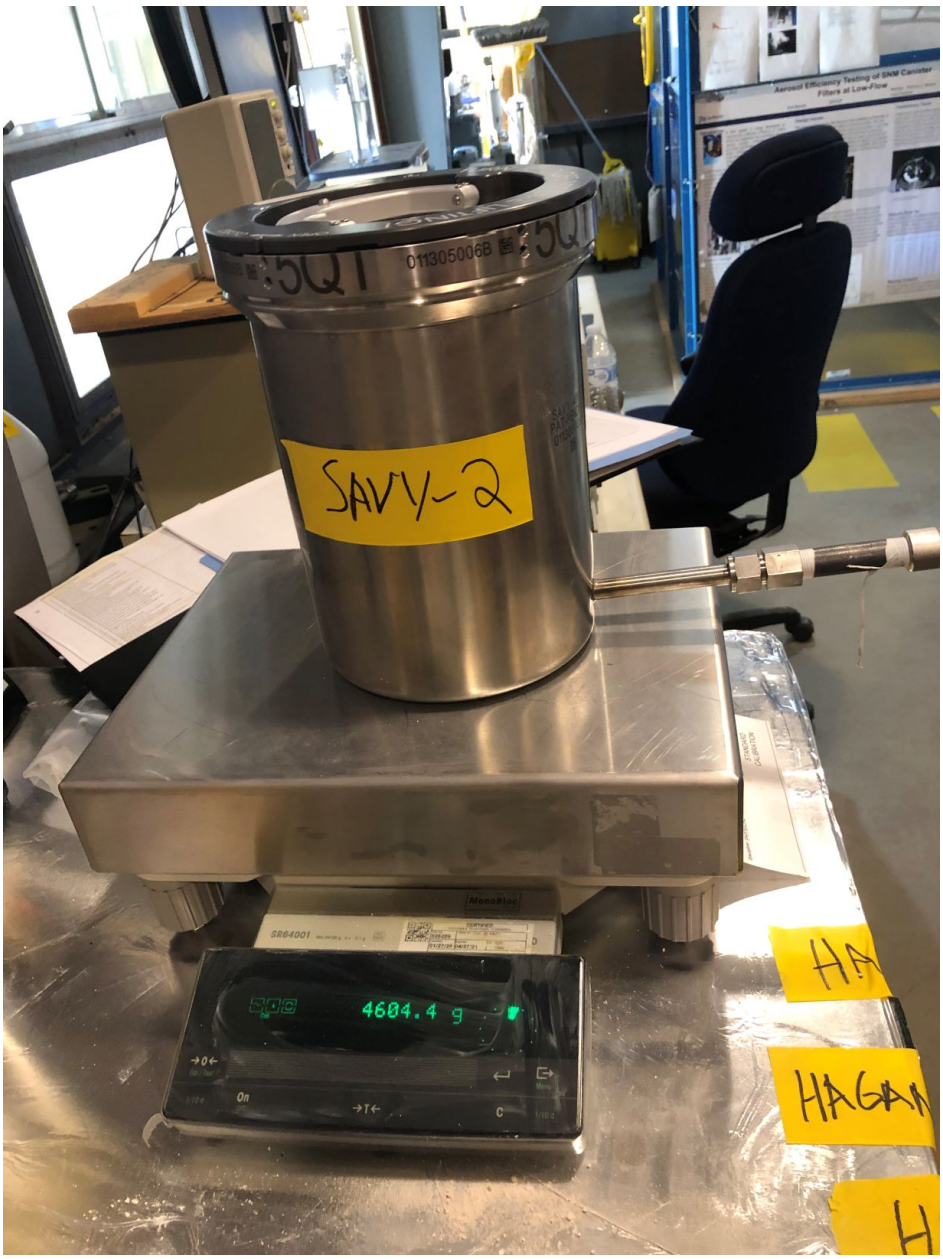
| | Preliminary Steps SAVY 2ND | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70 °F | | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | 1 | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 34 PSIG | Pressure (psig): | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | 1 | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | | |
| 17 | Set and record wind tunnel speed (Hz): | 27 HZ | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: 34 PSIG | Pressure (psig): PSIG | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | | |
| 27 | SN: 0813050026B, 0813051351 | | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 7TH | 1 | 5.00x10-4 |
| 30 | Pre-Test Mass Total 4604.4g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-4-20 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 Moore Nuc Fil 6 | Assistant 3: | | |
| | Operator 1: M MOORE | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(2) 1.5x10-4 mg/m3 (3) 9.6x10-6 (4) 1.2x10-6 (5) 1.8x10-6 (6)

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(9) 1.5x10-5 mg/m3 (10) 5.5x10-6 (11) 2.4x10-6 (12) 1.8x10-5 (13) 5.6x10-6 mg/m3

Post-Test Final Mass 4604.4g STD




Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps SAVY 3RD | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 34 | Pressure (psig): 34 | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | V 1 | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27Hz | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): 34 PSIG | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | 1 | |
| 27 | SN: D113050066, D813051351 | | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse 7TH | 1.4x10-4 | |
| 30 | Pre-Test Total Mass 4693.9 g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: p. 131 Moore Nuc Filo | Assistant 3: | | |
| | Operator 1: M Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(2) 2.2x10-5 mg/m3 (3) 6.9x10-7 mg/m3 (4) 5.3x10-6 (5) 4.5x10-6 (6) 1.1x10-5

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(9) 6.8x10-6 mg/m3 (10) 1.0x10-6 (11) 2.3x10-6 (12) 3.0x10-6 (13) 8.1x10-7 mg/m3

Post-Test Total Mass 4623.9g STD


Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps SAVY 4TH | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 34 PSIG | Pressure (psig): | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 Hz | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | | |
| 27 | SN:012005 124 B/L | | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 8TH | $3.0 \times 10^{-5}$ | |
| 30 | Pre-Test Total Mass 4644.4g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 Moore NucFil-6 | Assistant 3: | | |
| | Operator 1: M Moore | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(2) $2.4 \times 10^{-5}$ mg/m³ (3) (4) $8.3 \times 10^{-6}$ (5) $4.2 \times 10^{-6}$ (6) $5.8 \times 10^{-6}$

\\dcstorage.lanl.gov\to55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(9) $5.9 \times 10^{-6}$ mg/m³ (10) $2.9 \times 10^{-5}$ (11) $2.5 \times 10^{-6}$ mg/m³ (12) $8.4 \times 10^{-6}$ (13) $5.16 \times 10^{-6}$

Post-Test Total mass 4644.4g -STA

Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps SAVY 5TH | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70°F | 1 | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): 34 | Pressure (psig): | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | 1 | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 Hz | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): 35 PSIG! | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | 1 | |
| 27 | SN: 012005124 B/L | | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | 2 |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 8TH | 1.2x10-4 | |
| 30 | Pre-Test Total Mass 4734.3g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-2020 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 Moore Nuc Fil6 | Assistant 3: | | |
| | Operator 1: M MOORE | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(3) 1.9x10-5 mg/m3 (4) (5) 2.8x10-6 (6) 3.5x10-6 (7) 4.4x10-6 (8)

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(11) 3.7x10-6 (12) 3.2x10-6 (13) 3.4x10-6 (14) 9.2x10-6 (15) 0.00 mg/m3

Post-Test Total Mass 4743.4g STD

**SAVY 5th**. Note the transcription error for the Post Test Total Mass (4743.3 g). The post-test photo captured the correct mass as 4734.3 g.


Pre test


Post test

**Operation procedure punchlist and container information sheet. (RTG in a can - 30 psig series)**

| | Preliminary Steps SAVY 6TH | Note | Operator number | Assistant number |
|---|---|---|---|---|
| 1 | Walk through room 103 and organize work area. | | 1 | |
| 2 | Record the date, operator, logbook name & page. | | 1 | |
| 3 | Record serial number and volume of test can. | | | 2 |
| 4 | Note room temp (deg F). | 70° | | |
| 5 | Z:\RTG in a Can - 30 psig test\Moore ME 2020 RTG in a Can - 30 psig test.xlsx | | | |
| 6 | Calculate charging pressure for gray 9 gallon Drierite 106-C vessel for 30 psig pulse. | | 1 | |
| 7 | Note charging pressure (psig): | Pressure (psig): 34 PSIG | | |
| 8 | Ensure vessel 106-C will not initially be pressure charged. | | | |
| 9 | Note valve V5 is open, to not charge vessel 106-C. | | 1 | |
| 10 | Note valve V6 is closed, to not charge vessel 106-C. | | 1 | |
| | In Process Steps | | | |
| 11 | Prepare container to be tested. | | | 2 |
| 12 | Install test can above ball valve on vessel 106-C. | | | 2 |
| 13 | Close and lock tower door. Seal with "In Use" yellow tape. | | | 2 |
| 14 | | | | |
| 15 | Turn on air compressor. | | 1 | |
| 16 | Adjust regulator PCV1 and use PRV1 to set charging pressure, if needed: | | 1 | |
| 17 | Set and record wind tunnel speed (Hz): | 27 HZ | | |
| 18 | | | | |
| 19 | Note valve V5 is closed, to charge vessel 106-C. | | 1 | |
| 20 | Note valve V6 is open, to charge vessel 106-C. | | 1 | |
| 21 | Verify gray vessel Drierite 106-C is pressurized. | | 1 | |
| 22 | Verify charging (system) pressure on PI3: | Pressure (psig): 35 PSIG | | |
| 23 | Turn aerosol particle counter on. | | 1 | |
| 24 | Create filename with format: Logook and page, test series and ID info. | | 1 | |
| 25 | Start AIM software for drop test sampling (60 sec count, 90 count cycles) | | 1 | |
| 26 | Pre-drop BKG concentration validate 1.0E-5 mg/m3. Note five cycles of 1 min. | | 1 | |
| 27 | SN: 012005124 B/L | | | |
| 28 | Toggle ball valve above gray vessel Drierite 106-C for a one to two second pulse. | | | |
| 29 | Note sample number of aerosol particle counter. | Sample number at pulse: 8TH | | |
| 30 | Pre-Test Mass Total 4826.8g | | | |
| | Post-test Steps | | | |
| 31 | Save data files, record file names and location | | | |
| 32 | Verify background is about 1.0E-5 mg/m^3 before opening door. | | | |
| 33 | Open RRFMC door | | | |
| 34 | (Optional) DR measurement | | | |
| 35 | (Optional) DR Measurement filter. | | | |
| 36 | Turn air compressor off and open bleed valve. | | | |
| 37 | Perform post-test activities | | | |
| 38 | RRFMC data analysis and test report. | | | |
| | | | | |
| | | | | |
| | Date: 12-9-20 | Assistant 2: J DAVIS | | |
| | Logbook: p.131 MOORE NUCFIL-6 | Assistant 3: | | |
| | Operator 1: M MOORE | Assistant 4: | | |
| | ***Note: Only record the operator number after completion of the step.*** | | | |

(3) $6.7 \times 10^{-6}$ mg/m³ (4) $5.8 \times 10^{-7}$ (5) 0.0 mg/m³ (6) $6.5 \times 10^{-6}$ (7)

\\dcstorage.lanl.gov\ta55\SAVY-4000 Lifetime Extension\RTG in a Can - 30 psig test\[Punchlist - RTG in a Can - 30 psig - R3.xlsx]Sheet1

(10) $9.5 \times 10^{-6}$ mg/m³ (11) $2.3 \times 10^{-6}$ (12) $9.9 \times 10^{-7}$ (13) $3.0 \times 10^{-6}$ (14) $1.8 \times 10^{-7}$ mg/m³

Post-Test Total Mass 4826.0g STD,

Pre test


Post test

## 13.0 FILES TO LOCATE METADATA INFORMATION.

1) "Z:\RTG 2ND - 30 psig\AP-341-605-R4- Moore and Davis Dec 2020 Pressurizing Hagan and SAVY containers to 30-psig.docx"
2) "Z:\RTG 2ND - 30 psig\2ND Excel calcs\2ND RTG in a can - summary of tests.xlsx"
3) "Z:\RTG 2ND - 30 psig\2ND Excel calcs\Pre and Post container masses - logbook and photos recorded.xlsx"

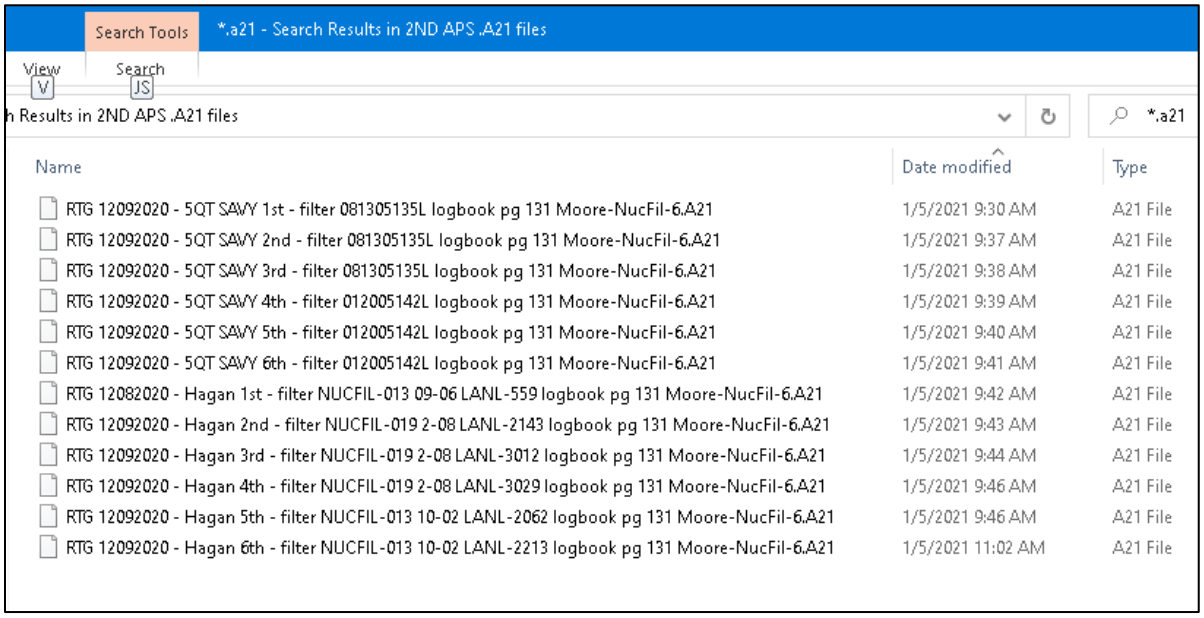


Figure 14. The TSI Inc. APS Aerodynamic Particle Sizer generates data files with a *.A21 format extension. (e.g. "Z:\RTG 2ND - 30 psig\2ND APS .A21 files\RTG 12092020 - 5QT SAVY 1st - filter 081305135L logbook pg 131 Moore-NucFil-6.A21")

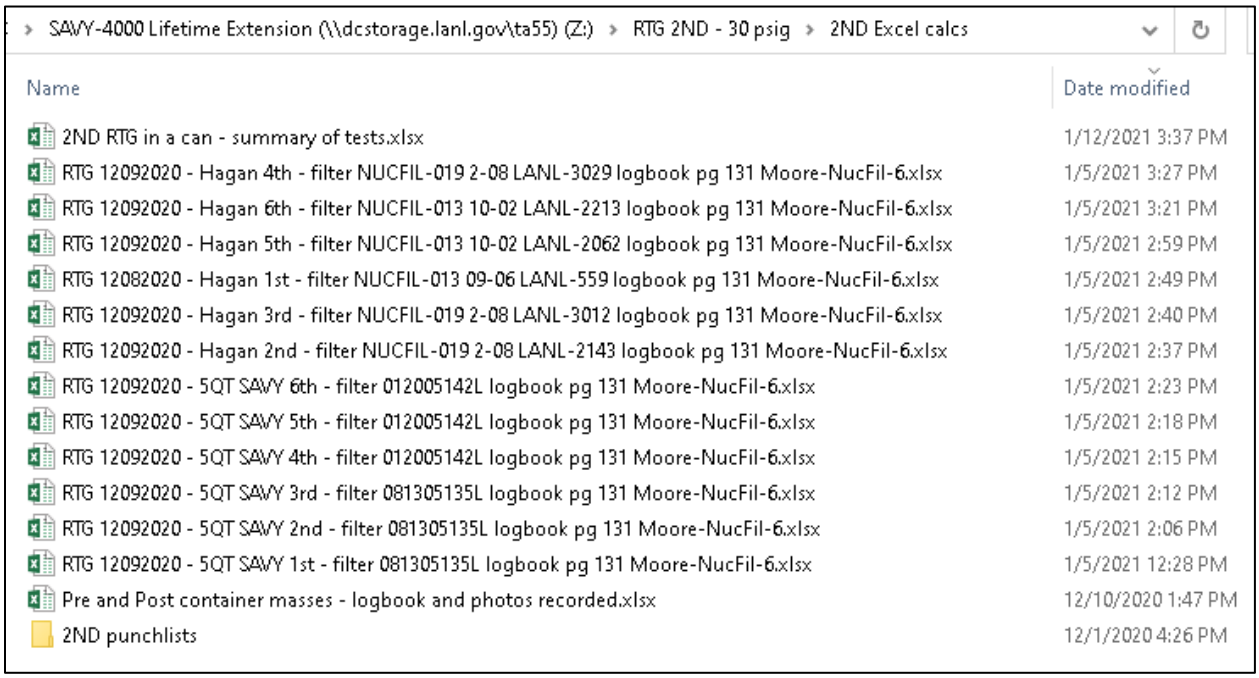


Figure 15. Excel spreadsheets to calculate the respirable mass values.